CERTIFICATE BY GUIDE

Certified that **DR. TEJASVI GUPTA,** is a bonafide post-graduate student in the department of Oral And Maxillofacial Surgery in M. M. College of Dental Sciences and Research, Mullana, District Ambala, Haryana and is registered with M. M. (Deemed to be) University, Mullana, Ambala. She shall carry out genuine, scientific research work on his dissertation project on **"COMPARATIVE EVALUATION OF**

LAURELL-GOTTLOW'S SUTURING TECHNIQUE VS CONVENTIONAL INTERRUPTED SUTURING TECHNIQUE IN DENTAL IMPLANT CASES" under our direct supervision.

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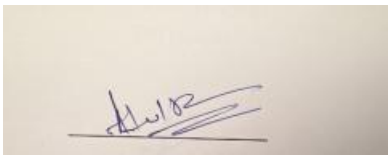
CERTIFICATE BY THE HEAD OF THE DEPARTMENT

This is to certify that **"COMPARATIVE EVALUATION OF LAURELL-GOTTLOW'S SUTURING TECHNIQUE VS CONVENTIONAL INTERRUPTED SUTURING TECHNIQUE IN DENTAL IMPLANT CASES"** will be a bonafide dissertation work which will be done by **Dr. Tejasvi Gupta** in partial fulfilment of requirements for the degree of **Master of Dental Surgery** in the specialty of **Oral and Maxillofacial Surgery** at **Maharishi Markandeshwar (Deemed To Be) University**, **Mullana, Ambala**.

Facilities for carrying out this project exist in the department and the attached medical college hospital in the same campus.



DR. ATUL SHARMA

Professor and Head

Dept. Of Oral and Maxillofacial Surgery

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Mullana, Ambala

Date: 03/03/2026

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INTRODUCTION

Dental implants are used to rebuild the deficits made by loss of dentition(complete/partial). The placement of which is a predictable and widely acceptable modality for the replacement of missing teeth providing higher survival rate and advantageous functional outcome. Earlier implant success was evaluated considering the osseointegration and marginal bone stability[1] However, the successful outcome of any implant procedure relies on the interrelationship of various components[4]. Implant dentistry considers peri-implant soft tissue health and inflammation to be critical determinants of implant success .This success includes inception of health, function and esthetics.[2,3]

Dental sutures are vital component of oral surgery playing a significant role in approximation of the flaps over the implant, closure of wound, stabilization and preservation of blood supply along with reduction of dead space around the implant to ensure uneventful primary healing. Selection of relevant type of suturing technique is essential for achieving desired surgical outcomes. They can be classified based on various attributes like absorbability, structure of the strand,composition of the material and type of technique used.[5]

Therefore, multiple traditional suturing techniques have been used over a period of time such as interrupted, figure of eight, continuous, horizontal and vertical mattress. Interrupted sutures are one of the most commonly used suturing technique involving insertion of a single suture through the sides of a wound and using surgeon's knot to secure .Interrupted sutures are placed 4-8mm apart allowing the even distribution of tension across larger wounds. As each suture is independent of another , loosening of one suture does not affect the stability of other. This technique can withstand significant stress, making it suitable for high tension areas. Another technique names as horizontal mattress is designed to provide eversion of the mucosal margins, thereby enhancing contact between raw tissues, here suture is placed horizontally across the incision. The major advantage of this technique is its ability to improve wound eversion and promote healing in areas with significant tissue loss.[6.]

These techniques may or may not always provide the required peri-implant soft tissue adaptation leading to inflammation and infection due to accumulation of debris in the peri-implant space due to inadequate soft tissue seal leading to wound dehiscence and bacterial contamination[3]. Hence to overcome these short comings many new suturing techniques, specialised approaches are developed.[3]

Lars Laurell and Jan Gottlow developed a specialized approach that combines both techniques horizontal mattress suture and simple interrupted suture in a single step [7] that may show promising results in surgical procedures and reduction in peri implantitis. This technique was designed to empower the surgeon to suture on two planes concurrently.[7] The interrupted stitch of this suturing design at no point passes through the tissue, as it stays completely exterior to the flaps and is only secured to the loop of mattress suture. [7]

This study combining the horizontal mattress with conventional interrupted suture (LAURELL-GOTTLOW) will provide a comparative evaluation of Laurell-Gottlow suturing technique after the placement of the dental implants in comparison with the conventional interrupted sutures to identify the most beneficial technique and will contribute to evidence based surgical protocols and improved clinical outcomes in implant dentistry.

AIM AND OBJECTIVES

AIM:

To assess Laurell-Gottlow suture technique's effectiveness in comparison with conventional interrupted suture technique after the placement of Dental implant in the edentulous region present in maxilla or mandible.

OBJECTIVES:

- To monitor the intra-operative time taken for suturing
- To assess flap eversion
- To assess the healing post operatively
- To assess post operative inflammation & peri-implantitis
- To assess post operative pain
- To assess any complication that may arise.

REVIEW OF LITERATURE

1. **T. Alberktsson et. al (1986)[4]** carried out a study on the long term efficacy of currently used dental implants and stated that the successful result of implant procedure relies on the interrelationship of various components like biocompatibility of the implant material , macro and microscopic nature of the surface of the implant, surgical technique used , undisturbed healing phase along with status of the

implant bed and it was concluded that two dental implant systems, branemark osseointegrated screw and small transosteal staple presents acceptable long term results and more studies are need to be made for further development in the field of oral implantology.

2. **Nicolaas C. Geurs et. al (2010)**[3] proposed a study to evaluate soft tissue considerations in implant site development. They stated that healthy soft tissue around dental implant is essential for successful implant restoration that includes the establishment of health, function and esthetics .It also described the peri-implant mucosa that is supplied by the supraperiosteal blood vessels. They also highlighted the importance of adequate keratinized mucosa , thickness of tissue and preservation of papillae to ensure long term stability of implant along with significance of careful treatment planning and atraumatic surgical approaches.

3. **Mohammad shahabouee et. al (2011)**[2] executed a study to evaluate microflora around teeth and dental implant. Their aim was to comparatively assess the microbiological parameters in sulci around the prosthesis supported by dental implants. Study was a prospective, crossectional type done on 34 partially edentulous patients with 50 anterior maxillary single implants with cemented crown and 34 similar teeth in the same jaw of the patient . Six anaerobic bacteria were found in teeth and implant sulci and those were gram positive cocci , gram-negative cocci, prevotella, Porphyromonas gingivalis ,bacteroid fragilis and fusobacterium and it was finally concluded that microflora in implant sulci is similar to the flora around the tooth and implants susceptibility to inflammation is same as teeth.

4. **R.Sentineri et. al (2016)**[9] modified laurell gottlow suture for tight closure of wound with a single line of suture , they proposed that healing of wound requires precise approximation of wound edges . laurell gottlow suturing technique is a modified horizontal mattress suture which provides evertion of the wound margins with added benefits of interrupted suture . Senteneri modification gives an additional buccal knot that ensures close contact between inner paramarginal portion of the flaps along with the gottlow's benefits like evertion of the margins and reduction in the dead space . It was also stated that this suture could be a faster and less traumatic alternative to mattress suture and provides single line of closure of the wound.

5. **Chiara Cinquini et. al (2022)**[1] conducted a study to evaluate the histology of soft tissues around dental implant abutments. They stated

that osseointegration is not the only factor for the success of dental implants . A successful implant requires various other factors such as development of soft tissue, therefore the surface that is in contact with the soft tissues is of utmost importance as it affects the capacity of the peri-implant mucosal cells for creating tight seal around the implant. The main key factors that were considered in the study included the composition of the implants, soft tissues adhesion around the implants. This study concluded that in order to place a successful implant tissue height, thickness, choice of right material and the surface treatment should be given equal importance to that of osseointegration.

6. **Nourah Nasser almalik et. al (2024)**[5] conducted a study on types , techniques and role of dental sutures in oral surgery and healing of wound . They stated that suture not only help in mechanical support but also protect the wound from contamination , infection and accelerate the healing process . Further advancements in sutures like the antibacterial sutures , barbed sutures have improved the surgical outcomes by reducing infection rates and enhancing efficiency . In conclusion despite their benefits there are several challenges related to suturing like tissue reaction , infection and knot related issues that are seen if proper suturing technique is not employed and to overcome these challenges proper training, careful planning and appropriate technique should be used to enhance surgical success and promote rapid healing.

7. **Dr Gayathri et. al (2024)**[6] conducted a study to evaluate comparative review of different suturing techniques in oral surgery and stated that suturing is essential part in oral surgery for effective closure of wound, tissue approximation and optimal healing.There are various suturing techniques. Out of all,simple interrupted is valued for its strength and ease of cleaning ,continuous mattress allow for rapid closure of wound along with even distribution of the tension, locking sutures provide watertight closure but lacks adjustable tension, vertical and horizontal mattress suture enhance tissue approximation and healing while figure of eight technique is beneficial for closing edentulous spaces . It was concluded that selection of appropriate technique should be based on the surgeon’s skills, type of surgical site and the desired functional and aesthetic outcomes.

8. **Nuri mert Taysi et. al (2025)**[8] proposed a in vitro study on mechanical performance of non absorbable monofilament suture

material tied with different suturing techniques under various knot configuration In this study, the authors compared three different nonabsorbable, monofilament suture materials which were tied with three different configurations and two suturing techniques. Technqiues used were Laurell-Gottlow and Horizontal mattress . Specimens manufactured using a 3-D printer underwent microtensile testing to determine maximum load failure and elongation rates. Laurell-Gottlow yielded significantly higher failure load and lower elongation rates than horizontal mattress using nylon and polypropylene. Polytetrafluoroethylene suture remained more stable over time. The findings indicated that the LaurellGottlow suturing technique provided better mechanical resistance to external forces when used with non absorbable monofilament suture materials and entailing a surgeon's knot and three square knots appeared to be the best choice of all the tested material and technique.

MATERIALS AND METHODS

STUDY DESIGN

This is a comparative study of total 40 patients , which are randomly divided and selected . Among them group A will include 20 patients with laurell gottlow suturing technique and group B with conventional interrupted suturing technique after the placement of the dental implant and complete records will be noted, compiled and put to statistical analysis.

STUDY SETTING

This study will be conducted on the patients with edentulous region (complete/partial) present in maxilla or mandible reporting to the out-patient department (OPD) in Department of Oral and Maxillofacial Surgery, M.M.C.D.S.R (Deemed to be University), Mullana, Ambala . The study will be carried out after due clearance from the Institutional Research, Review Board and Institutional Ethical Committee.

STUDY OF DATA

A total number of 40 patients with edentulous region in maxilla or mandible (complete / partial) reporting to the out-patient department (OPD), Department of Oral and Maxillofacial Surgery, M.M.C.D.S.R (Deemed to be University), Mullana , Ambala will be selected for the study. Informed consent will be taken from each patients prior to the surgical procedure.

STUDY MATERIAL

- 3.0 Black Braided Silk Suture (Reverse Cutting)

SAMPLE SIZE

- 40 patients

SELECTION OF PATIENTS

Patients planned for dental implant placement in edentulous regions present in maxilla or mandible under LA.

SELECTION OF SITE

Patient will be determined by Coin toss method. If "head" comes the site will be allocated Group A i.e. Laurell - Gottlow suturing technique will be used for primary wound closure and if "tail" comes site will be assigned to Group B i.e. conventional interrupted suturing technique.

INCLUSION CRITERIA

- Patients ranging from more than 18 years to less than 60 years of age.
- Including both male and female patients.
- Patients categorized under ASA I and II.
- Only clean incisions which can be approximated without tension will be included.
- The patient should be co-operative and conscious of his/her hygiene · The patient should be willing to participate in the study.
- Length of incision minimum 10mm and above.

EXCLUSION CRITERIA

- Patients having severe systemic conditions.

- Patients having known history of allergy to local anaesthetic solution.
- Patient taking drugs that might interfere healing.
- Patients who are not willing to enroll themselves in the study.

PARAMETERS TO BE STUDIED:

- Time taken for suturing .
- Approximation of wound margins
- Eversion of the margins
- Blanching and Redness
- Healing of the wound post operatively.
- Food debris accumulation.
- Post operative Pain- based on visual analogue scale.
- Wound dehiscence - observed clinically by visual examination only.

ARMAMENTARIUM:

- Williams Probe
- Mouth mirror
- Tweezers
- Suction cannula
- Disposable syringe (2 ml) with needles (24 gauge)
- Lidofix 2%.(Lignocaine2% with adrenaline 1:200,000)
- Surgical scalpel No: 3 · Bard Parker blade no. 15
- Molts no.9 Periosteal elevators
- Mayo-Hegar Needle holder
- Tissue forceps (toothed and non-toothed)
- Metzenbaum Scissors
- Straight mosquito Artery forceps

- 3-0 silk black braided suture (Reverse Cutting)

PROCEDURE

- The patient will be shifted to Minor OT and made comfortable. Surgical site will be thoroughly cleaned and disinfected followed by painting and draping under all the aseptic conditions to prevent infection.
- Local anaesthesia will be administered at the surgical site to achieve haemostasis and anaesthesia .
- Incision will be given at potential site of implant placement.
- Mucoperiosteal flap will be raised with minimal trauma to the surrounding tissues, ensuring preservation of blood supply and healing.
- Once the site is exposed appropriately, site will be prepared with drills of appropriate size and dental implant will be placed at the predetermined location taking care of position, angulation, and depth to achieve primary stability.
- After implant placement and proper irrigation, flap will be repositioned to achieve primary closure using “laurell gottlow” suturing technique in group A and “simple interrupted” suturing technique in group B.
- After closure, operative site will be assessed for hemostasis and blanching. The patient will be given postoperative instructions, medications, and followup appointments to monitor healing.

POST OPERATIVE EVALUATION PARAMETERS

1. **Intra-operative time for closure of wound:**

Using a digital stopwatch, the amount of time needed to finish the suturing i.e laurell gottlow suturing technique in group A and simple interrupted in group in group B will be calculated in minutes.

2. **Eversion of The Wound Margin**

Margins of the mucoperiosteal flap will be assesed subjectively by the examiner for the eversion achieved after the closure of the wound using

Laurell Gottlow suturing technique and simple interrupted suturing technique.

3. Post-Operative healing of wound:

Post-operative healing of wound will be assessed on 3rd, 7th and 10th day post operatively with photographs of the surgical site

Different grades of wound healing according to **Southampton scoring system**[10]

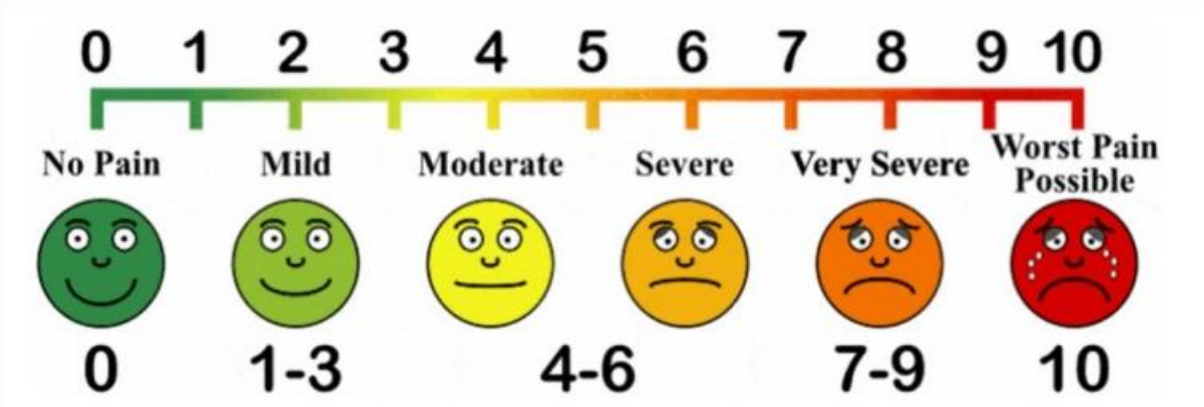
GRADE	**APPEARANCE**
0	**Normal healing**
I	**Normal healing with mild bruising or erythema**
I a	Some bruising
I b	Considerable bruising
I c	Mild erythema
II	**Erythema plus other signs of inflammation**
II a	At one point
II b	Around sutures
II c	Along wound
II d	Around wound
III	**Clear or haemoserous discharge**

III a	At one point only (<2cm)
III b	Along wound (>2cm)
III c	Large wound
III d	Prolonged (>3 days)
MAJOR COMPLICATIONS	
IV	**Pus**
Iva	At one point only(<2cm)
IV b	Along wound(>2cm)
V	**Deep or severe wound infection with or without tissue breakdown; hematoma**

Wound healing of all the subjects will be assessed by two independent investigators.

4. **PAIN -**The assessment of pain will be done subjectively post-operatively ❖ by recording verbal response of the patient.

❖ to rate patient's nociceptive experience on **Wong Baker scale**[11] which ranges from 0-10.



The values will be recorded postoperatively (on 3rd day, the 7th day and on 10th day)

5. FOOD DEBRIS

Assessing food debris will be done subjectively under good lightning to look for accumulated food particles (Present/Absent) around the suture site on day 3rd ,

7th, 10th post-operatively.

6. WOUND DEHISCENCE

Dehiscence of the wound will be assessed post operatively on day 7th in both the groups by checking for :- 1. gaping of wound margins .

2. Presence of exposed bone .
3. Presence of purulent discharge.

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INFORMED CONSENT DOCUMENT (ICD)

Patient / Participant information sheet

INFORMATION FOR PARTICIPANTS OF THE STUDY

1. **Title of the project**- -**"COMPARATIVE EVALUATION OF LAURELLGOTTLOW'S SUTURING TECHNIQUE VS CONVENTIONAL INTERRUPTED SUTURING TECHNIQUE IN DENTAL IMPLANT CASES"**

2. **Name of the investigator/guide**- Dr. TEJASVI GUPTA

(PRINCIPAL INVESTIGATOR)

GUIDE- DR. MEGHA GUPTA

(ASSOCIATE PROFESSOR)

3. **Purpose of this project/study**- To evaluate the efficacy of Laurell-Gottlow suturing technique in comparison to the conventional interrupted suturing technique after the placement of dental implant.

4. **Procedure/methods of the study**- Patients fulfilling the inclusion and exclusion criteria and planned for dental implant placement under Local Anaesthesia will be selected from Out Patient Department of Maharishi Markhandeshwar College of Dental Science and Research.

Intra operative time , evertion of wound margins and primary wound healing will be assessed along with Pain and accumulation of food debris and the values will be recorded postoperatively (on 3rd day, 7th day, 10th day).

5. **Expected duration of the subject participation-**. This is a randomized comparative study, the assessment will be performed as quick, short- spanned in order to avoid patient's discomfort. Patient will be called for follow up on 3rd day, 7th day, 10th day

6. **Any risks expected from the study to the participant**- There is no potential risk to the participant related to the study.

7. **Maintenance of confidentiality of records**- The data collected will be kept confidential and your personal identity will not be revealed in public but, the observed data may be published in scientific journals.

8. **Provision of free treatment for research related injury**- NONE

9. **Compensation for participating in the study**- NONE

10. **Compensation to the participants for foreseeable risks and unforeseeable risks related to research study leading to disability or death**- NONE

11. **Freedom to withdraw from the study at any time during the study period without the loss of benefits that the participant would otherwise be entitled**- The participant has all the freedom to withdraw from the study at any time during the study period without the loss of benefits that the participant.

12. **Possible current and future uses of the biological material and of the data to be generated from the research and if the material is likely to be used for secondary purposes or would be shared with others, this should be mentioned**- No

13. **Address and mobile number of the Principal Investigator (PI) and Co- PI, if any**:

Dr. Tejasvi Gupta, PG Resident, Dept Of Oral and Maxillofacial Surgery, MMCDSR, Maharshi Markandeshwar (Deemed To Be University), Mullana, Ambala, 133207.

_____ _____

Signature of the participant Signature of the investigator

_____

Place and Date

CONSENT FORM

Title of the project: "COMPARATIVE EVALUATION OF LAURELL-

GOTTLOW'S SUTURING TECHNIQUE VS CONVENTIONAL INTERRUPTED SUTURING TECHNIQUE IN DENTAL IMPLANT CASES"

Participant's name: Address:

The details of the study have been provided to me in writing and explained to me in my own language. I confirm that I have understood the above study and had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without the medical care that will normally be provided by the hospital being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). I have been given an information sheet giving details of the study. I fully consent to participate in the above study.

(I also consent / do not consent to use my stored biological samples for future scientific purposes: Yes/ No – if applicable)

Signature of the participant: _____ Date: _____

Signature of the witness: _____ Date: _____

Name and address of the witness:

Signature of the investigator: _____ Date: _____

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ORIGINALITY REPORT

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Publication

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